Integrated Water Quality and Aquatic Communities Protocol – Lakes and Ponds

Standard Operating Procedure (SOP) #1: Preparations, Equipment, and Safety

Draft Version 1.0

Revision History Log:

Previous Version	Revision Date	Author	Changes Made	Reason for Change	New Version

This SOP explains what procedures will be completed prior to implementing the field season, including reviewing the budget, hiring the field crew, reviewing equipment needs, preparing site description forms, creating maps, preparing data forms, setting up the database, setting up equipment, meeting park requirements, planning the training, and scheduling field crews.

The timeline for preparing for the upcoming field season is shown in Table 1 to assist in planning preparations.

Reviewing the Budget

The Project Lead will work with the Network Coordinator each year to review the budget and ensure it meets salary, equipment, travel costs, and projected costs for sample analyses.

Hiring the Field Crew

The Project Lead will be responsible for hiring the field crew leader and field crew member(s). If possible, priority consideration should be given to previous years' crew members to maximize year-to-year consistency in field operations and methods. However, since the interval between implementing the Lakes and Ponds is every 3 years, these seasonal employees may not be available. Thought should be given to assigning preference to crew members from the Streams protocol owing to familiarity with the Klamath Network park landscapes, procedures, and personnel.

The hiring of the seasonal employees should be initiated in the December of the preceding year to allow adequate time for flying the position, advertising the position, and giving adequate lead time for proper consideration of candidate qualifications. The hiring should be complete no later than March.

Table 1. Approximate timeline for starting preparatory tasks for implementing the Lakes protocol, with a field start date of 15 July. * indicates prior calendar year. EOD = Entrance on Duty date.

Task	Anticipated task start date	Must be completed on date
Reviewing the budget	1 October*	31 October*
Hiring the field crew		
Position information to Human Resources	1 November*	14 November*
Post position for 4 weeks on USAJOBS.gov	1 December*	31 January
EOD date for Field Crew Leader	7 July	
EOD date for Field Crew	14 July	
Equipment needs/reviewed/new gear ordered	1 November*	30 November*
Prepare site folders	1 March	30 April
Prepare data forms	1 March	30 June
Coordinate park requirements	1 January	28 February
Prepare and schedule training	1 March	31 May
Schedule field work	1 May	31 May
Prepare database with sites & contacts	1 May	31 May
Prepare water quality sampling equipment	7 July	14 July
Prepare field sheets	7 July	14 July
Prepare Electronic Units	1 July	14 July

The target qualifications of the Crew Leader are:

1. Prior experience in implementing aquatic monitoring protocols.
2. Limnological experience and training (preferably graduate level education).
3. Water quality analysis experience (e.g., water sample collection and processing).
4. Substantial backcountry orienteering and backpacking experience.
5. Experience and aptitude using Global Positioning Systems.
6. High level of physical fitness (ability to carry an average pack weight of 60 pounds over 3+ miles of rough terrain, spend 4 hours sampling a lake, and to return the 3+ miles in a single 12 hour period).
7. Familiarity with the geography and natural communities of either Lassen Volcanic National Park or Crater Lake National Park.
8. Leadership experience.
9. Strong organizational skills.
10. Ability to get along well with others in a field crew setting.
11. Certification in wilderness first aid (Wilderness First Responder preferred).
12. Ability to manage field crews for long periods of time.
13. Data management skills.

Note that all qualifications may not be possible in any one individual and it is the task of the Project Lead to select for the best combination of the above qualifications. Once selected, the

Crew Leader should review the protocol and discuss any questions with the Project Lead. The Crew Leader's Enter on Date should also begin a week prior to the rest of the crew to assist the Project Lead in this SOP.

The target qualifications of the field crew member are:

1. Knowledge and training in aquatic ecology (a demonstrated high interest in ecology can substitute)
2. High level of physical fitness (ability to carry an average pack weight of 60 pounds over 3+ miles of rough terrain, spend 4 hours sampling a lake, and to return the 3+ miles in a single 12 hour period).
3. Ability to get along well with others in a field crew setting.
4. Backcountry orienteering and backpacking experience.
5. Familiarity with either Lassen Volcanic National Park or Crater Lake National Park.
6. Knowledge of (or preferably, certification in) wilderness first aid.

As for the Field Crew Leader, the best combination of the above qualifications should be selected for by the Project Lead.

Soon after being hired, technicians should be mailed the following:

1. A written description of expectations, duties, and responsibilities, to be signed and returned (Appendix B. Expectation of Field Crew).
2. A copy of the Integrated Water Quality and Aquatic Communities – Lakes and Ponds Protocol, including all appendixes.
3. A list of required and recommended personal equipment.

Equipment Needs

Equipment will be organized and inventoried for the field season by the Project Lead several months (should be done in January) in advance of the training session. This allows time to make needed repairs and order equipment and supplies (Appendix L. Equipment List).

Appendix L presents the complete list of equipment needed to implement this protocol. Although the quantities listed are for the minimum number of lakes or ponds needed to accomplish the sampling objectives, extra consumable supplies should be a part of each field kit (e.g., extra 250 mL vials, extra 50 mL zooplankton vials, extra filters). Not all gear is required to be taken into the field and should instead be kept in the field vehicle or housing (e.g., laptop and computer cables).

Gear must be assured to be in excellent working order, and routine maintenance should be done on gear, as specified in later SOPs (e.g., care and cleaning of water quality multiprobes).

Prepare Site Folders

A folder for each lake and pond site to be sampled is developed and includes a site description and map (see example in Appendix G, Example of Site Folder). This site folder should collate and summarize information relevant to planning and field work from previous site visits to assist the new field crew. An additional laminated sheet of field sites (to be prepared by the Project Lead) will be included with the folders. Field site descriptions are completed by the field crew the first year a field site is sampled. Site descriptions include the trailhead or parking location, time taken to hike to the site in previous field visits, latitude and longitude coordinates, and a written description (if necessary) to help navigate to the site. The Project Lead, along with the Crew Leader, will mark and highlight all sites to be sampled in the field season on a set of USGS 7.5 min topographic maps. Coordinates will also be pre-loaded into the Garmin 60 CSx /76CSx or equivalent GPS unit for navigation purposes prior to the start of the field season. It is the responsibility of the Project Lead to make sure project folders are complete prior to the start of the field season and at the end of the field season.

Prepare Data Forms

An adequate number of data forms to fulfill training needs and provide for the entire field season should be printed on waterproof paper using a laser-jet printer (at least 50 sheets). The sheets will be individually numbered and meet the requirements of the Klamath Network Data Management Plan (Mohren 2007). The data forms will include the data sheets for lake habitat measurements and fish collection, as well as the event, incidental photo, calibration/equipment, and training logs. Example data sheets and forms are provided in Appendix F: Field Data Sheets and Logs.

Preparing Database

Prior to beginning the field work, the project database needs to be set up for field work following the methods described in SOP #13: Data Entry. In order to use the database, a GIS shapefile of lakes to be surveyed and a contact list of all members of the project need to be developed by the Project Lead working with the GIS Specialist. These two files automatically upload into the Access database and it is imperative that field names are kept the same from year to year. The GIS shapefile should be a polygon file projected as NAD83 Zone 10. The shapefile should be stored on the KLMN server at: G:\Monitoring\Water_Quality_Monitoring\Lakes\Lakes_GIS\PARK\YYYY and the name of the file is PARK_YYYY.dbf. In both the file pathway and the file name, the “PARK” is the 4 letter park code and YYYY is the year of the survey. The shapefile should contain the following fields:

a. Network
b. Park
c. Site_Name
d. Site_Type
e. GRTS Code
f. X-Coordinate
g. Y-Coordinate

h. Coordinate System
i. PLSS
j. Watershed
k. Subwatershed
l. County
m. USGS Map
n. GIS ID Number
o. GIS Shapefile Name

The contact lists should be in an Excel format and include any individual that may be using the database or collecting data as part of this protocol. The files should include the following fields.

a. Last Name
b. First Name
c. Middle Initial (if available)
d. Organization
e. Position Title
f. Address
g. Email
h. Phone Number

Park Requirements

In January, the Project Lead should communicate with Lassen Volcanic, Crater Lake, and Redwood National and State Parks to determine the contact person for each park**.** The Project Lead should contact each park to inform them of the survey schedule and to arrange for:

1. Crew housing and refrigerator facilities.
2. Necessary permits for sampling/backcountry access.
3. Keys necessary for crews to access facilities.
4. Park-specific radio training for field crews.

Prepare for and Schedule Training

The training sessions should be scheduled and materials should be prepared as detailed in SOP #2: Field Crew Training.

Scheduling Field Work

The target field season for the monitoring of mountain lakes and ponds is the middle of July to the middle of September. However, the logistics of accessing high mountain lakes and ponds dictate that the initiation of the field season is flexible. Sampling should begin reasonably soon after snow melts in Lassen Volcanic and Crater Lake National Parks, allowing for safe access to remote sites (but will not begin prior to July 15th). In years with late-lying snow, the Project Lead and Crew Leader will jointly decide when it is safe enough to commence sampling. For hiring purposes, however, it should be assumed that the start of the field season will be on or around

July 15th each year. In the event that a field season is delayed, the preferred option is to delay the crew start date as needed, but another option is to spend extra time training or assisting other monitoring efforts as needed. This may be a reality in heavy snow years, but it is not anticipated that delaying the field season will be a regular occurrence. Effects of heavy snow years will also be mitigated by scheduling the lower elevation lakes first, followed by the higher elevation lakes later in the year.

A further priority in determining field schedule is to match the previous sample dates from prior years to the current years. For example, if Lake Helen in Lassen Volcanic National Park was first sampled on July 16th, then the crews should aim for July 16th plus or minus 5 days the following sampling cycle. This will help the comparability of samples across years.

Personnel Safety

During field operations, the motto of the USGS should be adopted: "Safety first." All members of the field crew should be thoroughly familiar with the USGS safety manual: *USGS National Field Manual for the Collection of Water Quality Data: Chapter A9. Safety in Field Activities* (Appendix C), which was provided to them prior to the beginning of the field season. This manual should be considered the standard reference for safety questions and safety protocols, and in case any clarification is needed, the Project Lead should be consulted. Although this manual is comprehensive and not all elements may apply to the field crew, it is mandatory reading. These points are reiterated in Appendix O. Job Hazard Analyses. It is the responsibility of the Project Lead to go over and certify each crew member in the Job Hazard Analyses.

The following points also bear reinforcing:

- There are two main dangers of aquatic work: drowning and hypothermia.
- Automatic inflating suspender personal flotation devices (SPFD) must be worn while in boats or wearing waders.
- These must be worn on the outside of all clothing layers to ensure proper functioning. Crews are responsible to check that the CO_2 cartridge is full.
- Crews are highly encouraged to carry a spare set of dry clothes in case of accidental submersion.
- Basic first aid and CPR should be known by at least one member of each crew.
- Crews should pay particular attention to lightning storms; the mixture of water, high elevation, and electricity does not make for safe working conditions.

Preparing Water Quality Sampling Equipment

Preparing water quality equipment is a time-consuming process. Ideally, the field crew leader can be brought on a week before crew training and the commencement of sampling to help the Project Lead with these tasks.

Acid Washing Bottles

Clean, uncontaminated bottles and lids are essential for ensuring accurate results from field and laboratory analyses. Even slight amounts of contamination can contribute to large inaccuracies in measurements. Hence, the following protocols must be adhered to in the strictest sense.

This portion explains the process for preparing bottles for water chemistry sampling. These bottles need to be free from contaminants; washing them in a mild (0.5 Normal Hydrochloric Acid [HCl]) will accomplish this. Hydrochloric Acid, even when diluted to a relatively weak concentration, is still a hazardous substance and all precautions for personal safety should be followed. Employees conducting this SOP should frequently consult with the Project Lead or the SOU Chemistry Stockroom manager concerning facilities and safety requirements. At a minimum, the employee should have available:

- A fume hood with ample work room
- Protective eyewear
- Protective gloves (latex type okay)
- Protective labcoat
- Eyewash/shower station nearby (in the same room is preferable; if not located in the same room, then know location of nearest station)
- Ample amounts of a neutralizing agent (e.g., baking soda; sodium bicarbonate).

The bottles that need to be washed are: 250 mL Amber HDPE Nalgene collection vials, 2 L Amber HDPE Nalgene collection vials, and 60 mL Amber Boston Rounds collection vials. Consult SOP #9: Water Sample Filtration and Handling for further details on bottle use.

The numbers of bottles needing to be washed for a field season are 130 each of the 250 mL Amber HDPE Nalgene vials and 60 mL Amber Boston Rounds. This calculation is based on 59 sites, with the possibility of two samples at each site, plus 10% extra for potential loss or breakage. The 2 L collection vials should be washed when they are brand new and at the beginning of a field season; however, they will be reused throughout the field season without acid washing in between sites (SOP #9:Water Sampling Filtration and Handling).

Protocol for Acid Washing Bottles:

1. Needed materials:

    a. Safety gloves (latex okay)
    b. Safety glasses/goggles (prescription eyewear is *not* sufficient)
    c. Lab jacket/coat
    d. Concentrated HCl
    e. Distilled Water
    f. 1000mL Graduated Cylinder
    g. Glass jugs for storing and pouring HCl (2)
    h. Funnel, large
    i. Shallow trays (2 or more)
    j. Baking Soda (2+ pounds)

k. pH meter
l. Fume hood/Chemistry Lab Facilities
m. Glass stirring rod

2. Start by diluting concentrated HCl (which is 12 "Normal" [N]) down to 0.5N. Do all pouring and measuring in a fume hood. Use appropriate safety gear. At a minimum, wear a lab coat, gloves, and safety goggles or glasses.

   a. Mix 1 liter at a time (or less, if only small quantities are required)
   b. Use the $C_1V_1=C_2V_2$ formula, where C = concentration and V = volume. So, to make 1 L (or 1000 mL) of 0.5N HCl from 12N HCl, use dimensional analysis to solve for the unknown quantity of the 12N acid needed (here denoted as V_1):

$$(12N)(\text{Unknown } [V_1]) = (0.5N)(1000 \text{ mL})$$

$$12\ V_1 = 500$$

$$V_1 = 500/12$$

$$V_1 = 41.667 \text{ mL of 12N HCl necessary}$$

(Note that N [Normality] cancels out and you can round up to 42 mL)

   c. Measure 958 mL Distilled water in large graduated cylinder (note that 958 mL is the amount added to 42 mL HCl for a final volume of 1000 mL).
   d. Pour (using funnel) into 1 L glass jug.
   e. Measure 42 mL of HCl in a large graduated cylinder (note that it does not have to be exact - ± 2 mL is probably fine (although err on side of too strong).
   f. Using a funnel, add the 42 mL of 12N HCl to the 958 mL distilled water the glass jug.
   g. Acidic fumes may be given off in this step, so be sure to perform this in a fume hood with hood turned on.

3. After mixing 0.5N HCl, transfer a small aliquot to another glass jug. This is to facilitate easier pouring of the acid, which should minimize spillage.

4. Lay out the bottles to be washed in a shallow tray. Place caps in a separate, shallow tray.

5. Slowly pour enough 0.5N HCl into each bottle, making sure the acid reaches the top. This must also be done in a fume hood. Pour the acid into the bottle so that spillage is contained in the shallow tray. Some spillage is unavoidable, but careful pouring should minimize the spills. Use an additional funnel if necessary.

6. When all bottles have been filled, let sit for up to 8 hours, as time allows. After the 8 hours, carefully dump the used acid into a 25 liter bucket, again in a fume hood, wearing appropriate protective gear.

7. Refill the bottles with 0.5N HCl for an additional wash period. Repeat step 6 after it has sat for 8 hours.

8. For the caps, fill a shallow tray with 0.5 HCl and add the loose caps into the acid. While wearing gloves, ensure that each cap is submerged, so that the cap threads are adequately soaked.

9. Let sit for 8 hours, as time allows. Repeat with fresh acid, as you do for the bottles.

10. After the second acid soak, fill the bottles with distilled water and again let soak for 8 hours, or as time allows. After this, rinse all bottles and caps a minimum of three times under flowing distilled water.

11. Allow to completely dry, using a drying oven at 60° C, if available.

12. Cap the bottles and store in a large Tupperware type container.

13. Label the container with the following: type of bottle, acid washed with 0.5N HCl, date washed, and by whom.

14. Dispose of the waste acid that has been poured into the 25 L bucket by neutralizing the acid. When pouring waste acid into the bucket, *do not fill the bucket over half way*.

    a. Place the bucket with ~12.5 L of 0.5N HCl in a fume hood. SLOWLY add powdered baking soda into the acid.
    b. The sodium bicarbonate in the baking soda will react with the acid to neutralize the pH. This is an exothermic reaction; the acid will bubble and foam as heat is produced.
    c. Slowly continue to add baking soda to the acid. When the amount of bubbling and foaming begins to lessen, carefully use the pH meter to monitor the pH of the waste acid. A glass stirring rod can expedite the mixing process to accelerate the neutralizing process. The baking soda addition will gradually increase the pH to 6 or 7. When the pH is above 6.5, the waste can safely be poured down the drain.

15. In case of spills, pour a sufficient amount of baking soda onto the spilled acid. After foaming subsides, the neutralized acid can be cleaned up with paper towels.

Preparing Filters for Dissolved Organic Carbon

Samples for dissolved organic carbon (DOC) must be filtered (0.7 µm glass-fiber filters only – Whatman GF/F; Whatman product number: 1825-047) in the field for proper analyses. The filtering process removes suspended particles that may result in erroneous values for analyses of dissolved constituents. Similar to the bottles, the filters must be prepared by cleaning the

contaminants and carbon off of the filters. For this, the filters should be precombusted prior to use. The methodology for this is simple: Place filters in folded rectangles of aluminum foil large enough to cover filters (approximately 110 mm X 55 mm) with the dull side in (touching the foil). The foil and filters should then be combusted in a muffle furnace at 500°C for 4 hours. After cooling, the foil and filters should be placed in a plastic Ziploc type bag for field use. For specific instructions on muffle furnace operations, the manual supplied with the muffle furnace should be consulted.

Preparing Filters for Water Samples

The standard filter for water chemistry (anions, cations, nutrients) is Whatman GF/C (1.2 µm glass-fiber filters; Whatman product number: 1822-047). These must be prewashed in deionized water prior to use. To prewash, soak in a clean tub (acid washed tub) filled with deionized water, soak for a few minutes, and then dry in a drying oven at 60 °C. Store in original packing for transport to the field.

Preparing Bottles for Dissolved Organic Carbon

Amber glass vials for Dissolved Organic Carbon analyses must pre-treated similar to the filters. Vials (without the lids) should be placed into a muffle furnace and heated to 475° C for 8 hours. After 8 hours, the furnace should be shut off and the bottles allowed to cool to air temperature overnight. They should then be capped and stored for us. Note that the lids should not be combusted, only acid washed.

Preparing the Electronic Equipment

GPS Units

Navigation Units

Programming of GPS units needed for navigation (e.g., Garmin 76CSx units) to field locations should be undertaken with the help of the Network Data Manager or GIS Specialist. Entries should be set up to allow the easy use of the GPS unit, e.g., habitats are identified in the unit both with lake name and GRTS code. The datum NAD 83, Zone 10N is the Klamath Network standard that will be used for this protocol.

Trimble

The following settings should be set by the GIS Specialist or Data Manager prior to field work. Open ArcPad on the GPS unit and select GPS Preferences and enter the following:

GPS	Protocol: *Trimble GPScorrect*
Capture	Ensure the box is checked to *Enable Averaging* Number of Positions to Average: Points: at least *60* Vertices: at least *30* Streaming: Position Interval: *1* Distance Interval: *3 meters*
GPS Height	Input antenna height (1.0m if no antenna)
Datum	GPS Datum: *D_WGS_1984*

GPScorrect

- In ArcPad, from the GPS menu, select Trimble GPScorrect. Tap the section list button and then select *Setup*. In **Logging Settings**, ensure that Log GPS to SSF is set to *On*. Set Log H-Star Data to *No*. In **GPS Settings**, most often the slider is set all the way to productivity. Adjust **Real-Time Settings** as desired. If available, activate WAAS satellites to improve GPS accuracy. WAAS satellite are positioned over the equator, so for WAAS to work you will need a view of the southern sky.

GPS Analyst

These settings allow you to keep all GIS data in NAD83 UTM Zone 10N but collect GPS positions in WGS84. Upon upload to GPS Analyst, they will automatically reproject to NAD83 UTM Zone10N.

- Geographic Transformation: *NAD_1983_To_WGS_1984_5*
- Spatial Reference for GPS-enabled feature classes: *NAD_1983_UTM_Zone_10N / NAVD_1988*

Preparing GIS Data to Transfer to GPS Units

The following procedures should be done by the GIS Specialist and require that Trimble GPS Analyst extension for ESRI ArcGIS Desktop is enabled.

GPS-Enable Geodatabase and Feature Class

1. Open ArcCatalog.
2. Right-click the geodatabase and select *Properties*. Select the Trimble GPS Analyst tab.
3. Check the *GPS-enable geodatabase* check box as well as check boxes next to the relevant feature classes. Click OK.
4. The Select Geographic Transformation dialog appears. In the dropdown menu, select *NAD_1983_To_WGS_1984_5* and then click OK. At this point, a GPS Sessions feature dataset has been added to the geodatabase.
5. Now each feature class must be individually modified to your particular accuracy requirements. Right-click a feature class you want to GPS-enable and select *Properties*.
6. Select the Fields tab. You are going to add two new fields. Click the next blank row in the Field Name Column and type "Average_Est_Accuracy." In the same row, click the Data Type column and select *Double* from the dropdown menu. Create one more field, name it "Worst_Est_Accuracy," and define its data type as *Double*. When finished, click *Apply*.
7. In the Properties window, select the Trimble GPS Analyst tab. Store average estimated accuracy in the field you just created, *Average_Est_Accuracy*. Store worst estimated accuracy in the field *Worst_Est_Accuracy*.
8. Repeat Steps 5 through 7 for each layer you will be using in the field.

Prepare Feature Class Structure for Field Data Collection

Once a feature class is GPS-enabled, it is ready for GPS data but it may not be ready for attribute information you want to input in the field. The GIS Specialist and Data Manger will make sure the appropriate attribute fields are in the feature class.

Check Out Data for ArcPad

Besides checking out GPS-enabled feature classes, you can also check out background layers to view for context while in the field.

1. Open ArcMap.
2. Add layers you will need while working on ArcPad in the field. These include GPS-enabled feature classes, which are editable, as well as background layers. Symbolize the layers and set the zoom to the way you want them to be viewed in ArcPad, then save the ArcMap Document.
3. If the Trimble GPS Analyst toolbar is not currently open in the ArcMap interface, go to the View menu and select it from the Toolbars list. Or, right click any toolbar and select *Trimble GPS Analyst* from the menu.
4. From the Trimble GPS Analyst toolbar, click Get Data for ArcPad.
5. On the first page of the Get Data for ArcPad wizard, check all the layers you want to have while working on ArcPad in the field, then click *Next*.
6. On the next page, check all the feature classes you want to be able to edit, then click *Next*.
7. On the following page, choose a spatial extent option. Keep in mind that the full extent of the selected layer(s) will in some cases create large file sizes. If you choose the current display extent, be sure it covers the geographic area you would like to GPS.
8. On the same page, create a name for the folder that will be created to store the data (the format *project_YYYYMMDD* is recommended). Click and go to the location where you want to store the field data folder.
9. Click *Finish*.
10. **It is very important that at this point that you save the ArcMap Document!** If you neglect to do this, GPS Analyst will not "remember" checking out the data.

Transfer ArcPad Shapefiles to a Handheld

1. Connect the Trimble GPS unit to the computer with a USB cable. Microsoft ActiveSync will open. (If it does not, open it manually. If it did not open because the device was not recognized, you will need to troubleshoot the connection before continuing.)
2. Cancel or exit the ActiveSync partnership wizard if it opens. It is not necessary to establish a partnership.
3. In ActiveSync, click *Explore*. Copy or drag the field data folder (created in section 2.3.3, step #8) onto the mobile device. (Alternately, you can copy or drag the folder to the mobile device icon in Windows Explorer.)

When finished, disconnect the USB connection between the mobile device and computer and verify that the folder and its contents are on the field computer and can be opened in ArcPad.

Preparing the Amphibian Unit

Similar to the GPS units, the Amphibian (the trade name of the Eureka Environmental computer for running the water probe, ***not*** *a unit for monitoring "amphibian" species*) unit (or similar water quality data logger) should be loaded with pre-made files prior to the start of the field season. See SOP #10: Multiprobe Usage and Calibration for more details.

Preparing the Laptop

A laptop computer, for the use of the field crew, is to be prepared for the upcoming season. The use of the computer is for backing up data (from the Trimble, Amphibian, and digital cameras). File structure will be set up by the Project Lead for this purpose (SOP #12: Post-site Tasks). Additional files included on the computer will be backups of protocol-associated programming (e.g., ArcPad files for Trimble, site list for loading onto the Navigation GPS unit) as well as electronic copies of the complete protocol, appendixes (i.e., this current document), previous field season images, reports, and any incidental materials of use to the field crew.

The folders that will be included are:

Project_Database. This is the Access database into which data will be entered each night.

Documentation. This folder will contain any documentation that might be needed while in the field (e.g., Lakes Protocol, Equipment User Guides, etc.).

GIS_Data. This folder contains a copy of all the GIS data that were loaded on the Trimble unit and Garmin unit prior to starting the field season. These data are available as a backup in case something goes wrong with the layers on the handheld units.

Identification. This folder will contain any information needed to help with the identification of animals (e.g., Fish Identification Guides, ID Cards).

Other. An addition folder that can be used for any data files that do not "fit" into one of the above categories.

Literature Cited

Mohren, S. R. 2007. Data management plan, Klamath Inventory and Monitoring Network. Natural Resource Report NPS/KLMN/NRR—2007/012. National Park Service, Fort Collins, CO.